BOSTON REDEVELOPMENT AUTHORITY

FEASIBILITY STUDY

REPORT NO. 4

W. CHESTER BROWNE AND ASSOCIATES, INC.

ARCHITECTS AND ENGINEERS

122-128 Arlington Street, Boston, Massachusetts

PRELIMINARY DRAFT

FEASIBILITY STUDY

FOR

PROTOTYPE PLANS

FOR A

MULTI-STORY LIGHT MANUFACTURING PLANT

IN THE

SOUTH END URBAN RENEWAL AREA

IN THE CITY OF BOSTON

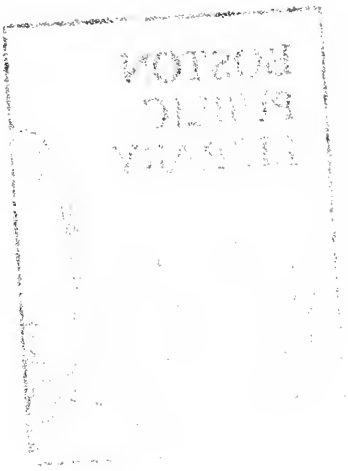
REPORT NO. 4

September, 1963

Prepared for

BOSTON REDEVELOPMENT AUTHORITY

BOSTON, MASSACHUSETTS



REPORT NO. 4

Physical features of the prototype have been described, and architectural design drawings submitted in previous reports. This report contains further detail, outline specifications, material take-off, preliminary engineering cost estimate and cost analysis.

In order to properly determine the most suitable and economical framing scheme for the building, we have made an analysis of various applicable structural systems.

Drawing S-1 shows framing and cost analyses for a typical bay for six different structural systems considered worth investigation. For comparison, we have included the two systems considered most suitable for the prototype in our preliminary engineering cost estimate section of this report. They are designated on Drawing S-1 as Scheme #1, Concrete Flat Slab with Drop Panels and Scheme #4, Two Way Grid Flat Slab. Total cost estimates for reinforcement, concrete and formwork are given in the column at the right-hand side of the drawing. Scheme #4 is $1.81 per square foot. Scheme #1 is $2.03 per square foot. The volume of concrete for the column and its capital is the same for both systems. The volume of concrete in the grid flat slab for a typical bay is 20 cubic yards, and for the flat slab with drop panels is 23 cubic yards. The saving in concrete for the grid flat slab will also be reflected as a saving in foundation cost, due to the reduction of dead load. This is delineated on Drawing A-11 which shows the estimated number of piles required at each column location for the above two systems and for a 4 and 6 story building. Due to the magnitude of the column loads and the nature of the soil in the area, we have based our foundation analyses on the use of concrete filled steel shell piles driven to refusal, with a load capacity of 105 tons per pile.

We believe the average length of the piles will be 60 feet at an estimated cost of $10.00 per lineal foot or $800.00 per pile.

Pages 1 to 10 inclusive of the preliminary engineering cost estimate section contain cost breakdowns of various parts of the work.

Pages 11 through 14 inclusive are cost summaries of 4 and 6 story buildings for both flat slab with drop panels and grid flat slab construction.

Page 15 is a tabulated cost analysis for the 4 buildings. It gives the total cost for each building and the proportion of total cost attributable to the various parts of the work.

The difference in cost between the flat slab and the grid flat slab systems for a 4 or 6 story building, respectively, is relatively small in the overall picture, but it is sufficient to recommend the use of the grid flat slab. The 6 story height is the most economical to build in terms of dollars per square foot building cost.

The cost analysis shows that buildings of this size and construction may be built for about $13.00 per square foot.

Additional stories beyond 6 will reflect an increase in cost per square foot because vertical transportation facilities would have to be increased to properly serve the added building population and area.

Additional horizontal increments in depth of the building will also increase the cost per square foot for the same reason.

Additional horizontal increments in length of the building will produce the same result, magnified by the cost of incorporating an expansion joint through the building.

OUTLINE SPECIFICATIONS

for a

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ARCHITECTS AND ENGINEERS

122-128 Arlington Street

Boston, Massachusetts

CONSULTING ENGINEERS INCORPORATED

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REPORT NO. 4

September, 1963

Project No. 73962

OUTLINE SPECIFICATIONS, MULTI-STORY PROTOTYPE LIGHT [illegible] PLANT,
SOUTH END URBAN RENEWAL AREA, CITY OF BOSTON, BOSTON [illegible]

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Project No. 73962

OUTLINE SPECIFICATIONS

SECTION I

ARCHITECTURAL

I-1. SCOPE OF THE PROJECT. -

The project consists of a multi-story manufacturing plant to be erected in the South End Urban Renewal Area located within the City of Boston.

The building will be 4 or 6 stories in height, and will have a partial basement. There will be a crawl space under the remainder of the building area with access from the basement. The basement will contain a Boiler Room, Transformer Vault, Electric Service Room, Building Maintenance, Storage, and Custodians' Room.

Each typical floor will have 4 tenant spaces consisting of Office and Manufacturing areas, toilet facilities, and stairways.

Freight elevator service is provided for each bank of tenant areas.

The building is served by two passenger elevators. Elevator machines are located in Penthouses on the roof.

The building is 6 bays long and 4 bays wide, all bays 28' x 28'. A continuous loading platform with canopy extends the full length of the rear of the building, at the ground floor level.

I-2. PREPARATION OF SITE. -

This includes removal of all existing obstructions, all excavation and backfill, fill placement and compaction, installation of bituminous concrete roads and parking areas, concrete walks, loaming and seeding and all related items to fully complete the work within the project limits.

I-3. FOUNDATIONS. -

The building is to be entirely supported on concrete filled steel shell piles, driven to refusal. Each pile to have a load capacity of 105 tons. Pile caps, grade beams, basement walls and floor slab to be reinforced concrete.

I-4. FRAMING. -

The superstructure will be of reinforced concrete columns, grid flat slab floor and roof slabs with no drop panels, reinforced concrete beams at stair, elevator and shaft openings three floors, and reinforced concrete spandrels.

I-5. MASONRY. -

Except for the insulated panels at the office facade, exterior walls of the superstructure are face brick, backed by concrete block or clay tile back-up units. Where back-up is the reinforced concrete frame, corrugated fill and galvanized steel anchors will be used.

Limestone will be used for window sills throughout and for trim on the office facade.

Permanent interior partitions will be concrete masonry units. Entrance stairs in main lobby are reinforced concrete with pre-cast terrazzo treads and risers.

Concrete floors in manufacturing areas, basement and loading platform will be left exposed and receive a floor hardener treatment.

I-6. ROOFING AND FLASHING. -

In general, roofing will be 20 year, bonded built up roofing, applied over rigid insulation and vapor barrier. Base flashings will be built up, cap flashings will be copper.

Roofs will have standard roof drains and interior conductors. Through wall flashing at exterior wall openings to be 5 ounce protected copper.

I-7. METAL WINDOWS. -

All windows will be intermediate grade, projected, steel, prepared to receive screens, ventilators as shown. Windows to be galvanized and bonderized, delivered with one shop coat of paint and be complete with hardware.

I-8. METAL CURTAINWALL. -

Curtainwalls to be 12 gauge, formed horizontal and vertical frames, welded construction, factory assembled. Panels approximately 1-3/4" thick, 18 gauge, galvanized, bonderized steel pan type with fiberglass insulation, and faced on the outside with 16 gauge porcelain enameled sheet with gasket sealed edges, "U" factor not more than .30. Field units and building unit to be delivered with one shop coat of paint.

I-9. DAMPPROOFING, WATERPROOFING, CAULKING. -

Unless otherwise noted, all basement walls will be dampproofed with two coats of brush applied bituminous material on the exterior face up to finished grades.

All exterior openings in masonry walls to be perimeter caulked with plastic caulking compound.

Waterproofing to be installed where required to be metallic cement plaster type.

I-10. GLASS AND GLAZING. -

Glass for metal sash to be double strength "B" quality, set in glazing compound.

Aluminum entrances will be narrow style with 1/4 inch plate glass.

I-11. MISCELLANEOUS IRON. -

This includes steel stairs, railings, elevator sills, metal thresholds, and guard angles.

Typical interior stairs will be pan type with [illegible] wide treads and landings and standard steel pipe rails. Stairs in [illegible] lobby will have aluminum rails.

I-12. METAL DOORS AND FRAMES. -

Interior doors in permanent partitions will be 16 gauge, 1-3/4 inch thick hollow metal with 16 gauge pressed metal [illegible] frame, jamb and trim.

I-13. METAL LATH AND PLASTER. -

Ceilings in toilet areas [illegible] suspended with channel, metal lath and three coat plaster, finish coat [illegible].

I-14. ACOUSTICAL TILE. -

Ceilings in the office areas and main corridor will be removable 2' x 4' acoustical panels, 1" thick. Exposed face of panels to be perforated .01" thick steel, back panel to be solid of same thickness, edges to be mechanically locked. Sound absorbing element to be non-dusting fibrous glass. Finish to be baked white enamel. Panels to be supported on an exposed T grid system with same enamel finish, and shall provide complete access to the space above the ceiling.

Acoustical ceilings are to be co-ordinated with lighting systems.

I-15. HARDWARE. -

All hardware shall be supplied and installed to adequately equip all operating units.

Keying system will be a Grand Master Key System.

I-16. TILE.-

Toilet rooms and service closets will have ceramic, non-slip tile floors and glazed ceramic tile dado. Dados will be applied by the thin set mortar method.

I-17. TERRAZZO. -

Main entrance vestibule and lobby will have terrazzo floor and base. Main entrance stairs will have pre-cast terrazzo treads and risers.

I-18. RESILIENT FLOORING. -

Corridors and office areas will have 1/8" thick x 9" x 9" asphalt tile floor covering. Masonry partitions adjacent to asphalt tile floors will have 4" high, standard rubber, set-on type base.

I-19. TOILET COMPARTMENT PARTITIONS. -

Toilet compartment partitions will be floor supported, flush type enameled steel partitions and doors.

I-20. MOVABLE OFFICE PARTITIONS. -

To be stock, flush type steel, sound deadened, movable units, heights as noted, factory finished, in baked enamel, designed to quickly accommodate any change in layout after original installation. All partitions and parts to be 100% reusable. All units to be shipped from the factory in one piece, all panel and door units interchangeable.

Doors to be 1-3/4" thick, complete with hardware. Frame shall be removable both sides for ready access to wiring raceway.

I-21. MOVABLE WIRE MESH PARTITIONS, MANUFACTURER'S NO. 1. -

To be stock, interchangeable, prefabricated, a mobile standard units which can be arranged in any desired combination, heights as [illegible], fabricated of 10 gauge steel wire woven into 1-1/2" diamond mesh securely welded to cold rolled channel frames. Door and service window panels as shown, all factory finished in baked enamel, and complete with hardware. All partitions and parts to be 100% reusable.

I-22. OVERHEAD DOORS. -

Doors from manufacturing plant to [illegible] vestibules are roll-up interlocking steel slat, [illegible].

Overhead doors to loading platform [illegible] heavy duty, steel, sectional type with counterbalance torsion spring. They shall be fitted as indicated.

I-23. ELEVATORS. -

Each passenger elevator will be 2000 pound, 12 person capacity with speed of 200 feet per minute, 6'-4" wide x 4'-5" deep platform size, automatic leveling, push button duplex selective operation, with horizontally sliding doors. Elevator machines located directly over the hoistway in a penthouse.

Each freight elevator will be 8000 pound capacity, Class C industrial truck loading, speed of 75 feet per minute, 10'-0" x 10'-0" platform, automatic leveling, with manually operated bi-parting vertical sliding doors. Machines to be located directly over the shaftway in a penthouse.

I-24. PAINTING. -

This includes the painting of all interior concrete masonry partitions, exposed interior surfaces of exterior concrete masonry walls, interior exposed concrete surfaces except floors, interior lather ceilings, exterior and interior ferrous metal, except factory finished movable partitions.

OUTLINE SPECIFICATIONS

SECTION II

PLUMBING

II-1 SCOPE. -

(a) Sanitary Drainage System:- Complete sanitary drainage system within the building, connecting to all fixtures, equipment, drains and vertical runs with tap-offs in shafts throughout the building for tenant use, extending and terminating the building main drains at a point ten feet outside the building.

(b) Storm Drainage System:- Complete storm drainage system in building for interior roof drains and canopy drains, extending and terminating the building main drains at points 10 feet outside the building.

(c) Domestic Cold Water System:- Complete domestic cold water system within the building, connecting to all fixtures, equipment, and vertical runs with valved tap-offs in shafts provided for tenant use. The system shall begin ten feet outside the building having a meter just inside and run horizontally in the basement area and crawl spaces rising where necessary.

(d) Domestic Hot Water System:- Complete domestic hot water system within the building; connecting to all fixtures, equipment, vertical risers with valved tap-offs in shafts provided and including steam run 140°F. hot water storage heaters in boiler room area. System shall include recirculating main with circulating pump. Mains shall be run through basement and crawl space areas.

(e) Gas System:- Complete gas piping system inside the building from the meter provided by the Boston Gas Company. The interior system shall include low pressure gas mains and risers, including risers with valved tap-offs in utility shafts.

all branches to gas firing equipment and appliances will be valved.

(f) Sprinkler System:- A complete sprinkler system will be installed in the basement and boiler room areas only and shall be installed in accordance to the latest City of Boston Code and the National Fire Protection Association. Fire extinguishers will be installed throughout the building to NBFU standards.

II-2. INSTALLATION:-

Installation shall be in accordance with the latest applicable City of Boston and Commonwealth of Massachusetts Codes.

II-3. MATERIALS. -

(a) Underground water services and interior piping above 4" size - cast iron cement lined bell and spigot class 150 water pipe with Class "D" cement lined fittings; joints to be made with oakum and lead.

(b) Interior water piping 3" and under - all hot, cold, recirculating water inside the building shall be type "L" copper tubing with cast brass fittings suitable for soldered joints. Joints shall be made with 95-5% tin-antimony solder.

(c) Gas Service - Standard weight iron size black steel pipe with screwed and/or welded joints.

(d) Soil, waste, vent and roof conductor piping. Extra heavy cast iron bell and spigot soil pipe and fittings. Joints made with oakum and lead. Vent piping 2" and smaller installed above ground may be galvanized standard weight steel pipe with cast iron fittings. Short waste branches to fixtures may be type "L" copper tubing or iron size brass or copper pipe with recessed drainage fittings.

(e) Sprinkler piping - Standard weight black iron steel pipe with malleable iron screwed fittings.

(f) Insulation - Pipe insulation shall be 1-1/2 inch molded fibrous glass low pressure insulation. Cold water and roof conductor lines shall have vapor barrier. Exposed piping shall have an additional 3 ounce canvas jacket. Hot water tanks shall be insulated with 1-1/2 inch thick 85% magnesia blocks with hard cement coat finish.

(g) Hot water storage heaters - Hot water storage tanks shall be constructed of steel with copper lining built for 117-1/2 pounds working pressure in accordance with ASME and Massachusetts Standard requirements. Tank shall be heated by steam with copper heating coils located inside the tank.

(h) Hot water circulating pump shall be automatic electric motor driven all bronze body of capacity required.

(i) Valves - Valves on water lines to be bronze or brass throughout with packing glands, stuffing boxes and nuts, solid wedge, screw or union bonnets, designed for 150 pound steam working pressure and shall have screwed ends except for sizes above 3 inches.

(j) Cleanouts shall be Boston Regulation pattern brass cleanouts installed at all points necessary to make all portions of the drainage system accessible for cleaning purposes.

(k) Plumbing Fixtures - Complete with trim, of the latest models of Crane Co., Kohler Co., or Eljer Co., wall hung whenever possible. Drinking fountains to be wall hung electric water coolers.

(l) Fire Extinguishers - Chemical first aid extinguisher designed and built to NBFU requirements. Soda and ash type generally and CO_2 type in mechanical equipment spaces.

(m) Toilet accessories - Mirrors, soap dispensers, shelves, paper dispensers, etc., as required.

(n) Floor and roof drains - Cast iron throughout, with brass strainers as required, Josam, Zurn, Smith, or equal. Watson (75) wall hydrants - non-freeze type - cast bronze.

SECTION III

III-1. SCOPE. -

The scope of the work, [illegible] consists of furnishing and installing complete [illegible] the following systems in the building:-

(a) Carpool. - Each system [illegible] will be designed to yield flexibility for [illegible].

(b) Heating and ventilating system. [illegible] area are included in this Section of the specifications [illegible] to suit tenant requirements.

(c) Boilers. - [illegible] complete with all appurtenances [illegible] per hour of steam in the boiler [illegible].

(d) Compressed air. [illegible] commercial source, at the option of the owner, [illegible] 75 psig with all required piping shall be [illegible] mechanical equipment room instead of the steam generators.

(e) Steam distribution. - [illegible] in the shafts of the manufacturing areas and boiler room. Including all [illegible] piping from the boiler room to the shafts and complete with [illegible], anchors, and expansion loops or joints.

(f) Capped branch tees. - At each floor, capped branch tees shall be provided on the supply and return risers in the shafts of the manufacturing areas for future connection of piping serving each tenant's manufacturing area.

(g) Metered steam. - If steam for heating and/or process is to be metered for each tenant, a condensate return shall be provided at each tenanted manufacturing area.

(h) Office area heating. - Finned tube baseboard radiation with piping, traps, valves and all accessories for heating the office areas to 72°F. when outside temperature is 0°F.

(i) Ventilation. - Ventilation supply and exhaust ductwork in each shaft. Ductwork shall be designed to provide 1.5 CFM per square foot of area.

(j) Toilet Ventilation. - Complete exhaust ventilation systems with roof fans, ductwork and registers to provide 12 air changes per hour.

(k) Insulation - Pipe insulation as applicable for the service including valves, flanges, fittings and equipment.

III-2. MATERIALS. -

(a) Piping and Fittings. - Steam piping shall be Schedule 40 black steel with malleable iron screwed fittings for piping 2 inches and smaller and welding fittings for piping 2-1/2 inches and larger. Condensate return piping shall be standard weight wrought iron with malleable iron screwed fittings for pipe 2 inches and smaller and wrought iron welded fittings for pipe 2-1/2 inches and larger.

(b) Valves - Gate and Globe. - Low pressure steam valves 2 inches and smaller shall be 125 pound class, bronze, with non-rising stem, screwed ends for sizes up to 2 inches and 125 pounds, flanged ends, cast iron body, bronze trim, outside screw and yoke type for sizes 2-1/2 inches and larger.

(c) High pressure steam valves shall be same as for low pressure except they shall be 250 pound cast iron class.

(d) Check valves shall be horizontal swing type of materials specified in III-2 (a) and (b).

(e) Pressure Reducing Valves. - Shall be pilot operated 125 or 250 pound cast iron body with stainless steel trim as required for the service. Basket type strainers shall be provided in the inlet connection to each valve. Relief valves shall be provided in the down stream connection with discharge pipe to atmosphere.

(f) Traps. -

(1) Inverted bucket type for draining high pressure steam lines and equipment.

(2) Float and thermostatic type for low pressure steam lines and equipment.

(3) Thermostatic type in the return connection of finned tube radiation.

(4) "Y" type strainers at inlet of each steam trap.

(g) Pressure gauges shall be Bourdon tube type and shall be provided at inlet and outlet of pressure reducing valves.

(h) Ductwork shall be galvanized steel of gauges in accordance with the latest edition of the "ASHRAE" Guide.

(i) Registers and grilles shall be of standard manufacturer of the sizes and capacities required.

(j) Fans shall be centrifugal roof type exhausters of size and capacity required, tested and rated in accordance with the AMCA and ASHRAE Codes. Fans shall be equipped with vibration eliminator bases and disconnect switch.

(k) Flexible Connections. - Asbestos cloth collars shall be provided at the duct connection of each fan.

(l) Fire Dampers. - Metal clad asbestos fire dampers with fusible link shall be provided as required by the Commonwealth of Massachusetts.

(m) Radiation. - Radiation in the office areas shall be finned tube baseboard type complete with shut-off valves and traps.

III-3. TESTING. -

All piping shall be satisfactorily hydrostatically tested prior to installation of insulation. Performance tests shall be conducted for the boiler room equipment, offices, heating systems and toilets exhaust ventilation systems prior to final acceptance.

III-4. MANUFACTURING AREAS VENTILATION. - The system shall consist of air handlers with ductwork distribution systems to the diffusers within each manufacturing area. Air handlers shall take air from the supply duct work in the building shaft and heating coils in the units shall be used as required in cold weather.

OUTLINE SPECIFICATIONS

SECTION IV

ELECTRIC WORK

IV-1. GENERAL. -

(a) All electrical work shall be in accordance with the latest rules and regulations of the National Electrical Code, the Electrical Inspection Department of the City of Boston, the Boston Fire Department, and the Massachusetts Department of Public Safety.

(b) The building owner will provide electric facilities for all secondary service equipment and feeders for all basement lighting and power, for corridor, stairway and foyer lighting, for elevators, street lighting, emergency lighting, and for public toilet lighting and miscellaneous outlets.

(c) The respective tenant will provide electric facilities for lighting over and above the basic lighting facilities provided by the building owner and for their individual power requirements, including air conditioning.

(d) The building owner will provide electric energy for all basement lighting and power, corridor, stairway and foyer lighting, elevators and street lighting. This energy will be metered by a single meter in the basement electric room.

(e) The respective tenant will provide electric energy for all lighting and power consumed within the respective tenant area. This energy will be metered by meters in the electric room adjacent to the tenant area.

IV-2. SERVICE. -

(a) Electric service for the project will be from underground lines of the Boston Edison Company, at either 2160 or 13,800 volts, 3 phase, depending on the building load, with transformation in each building to 120/208 volt, 3 phase, 4 wire.

(b) The Boston Edison Company will furnish and install the underground electric service to the building, charging the building owner for that portion of the installation from a point two feet inside the property line to the building. The Boston Edison Company will furnish and install required transformation and primary disconnects in a transformer vault provided by the building owner within the basement of the building.

(c) The Boston Edison Company will meter the electrical energy required by the building owner at a location in the electric room provided in the basement of the building. The Boston Edison Company will meter the electrical energy required by the respective tenants at the respective electric rooms adjacent to the tenant areas.

IV-3. SERVICE EQUIPMENT. -

(a) In the electric room, in the building basement, adjacent to the transformer vault, there will be a main building service disconnect switch, a building owner's service disconnect switch, facilities for building owner metering, a building owner's panelboard and service disconnect switches controlling the tenant feeders to the electric rooms on the various tenant floors.

(b) In the electric rooms on the various tenant floors, there will be tenant service disconnect switches, facilities for tenant metering and as required building owner panelboards.

(c) Service disconnect switches in the basement electric room will be of the standard type, of adequate size and interrupting capacity for the loads to be served.

(d) Tenant service disconnect switches will be suitable for attachment to bus duct and will be of adequate size and interrupting capacity for the loads to be served.

(e) Metering facilities will be as required by the loads being served.

IV-4. FEEDERS. -

(a) Feeders supplying building owner panelboards on the tenant floors, used for corridor, stairway and foyer lighting, and feeders to the elevator machine rooms will be of conduit and cable of adequate sizes for the loads being served. These feeders will originate at the building owner's panelboard in the basement electric room.

(b) Tenant feeders to the electric rooms on the various tenant floors will be of plug-in bus-duct type of adequate capacity for the loads being served. These feeders will originate at service disconnect switches in the basement electric room.

(c) In each building, there will be one building owner's panelboard feeder, one feeder for each grouping of elevators and two tenant feeders, one for each tier of electric rooms.

IV-5. PANELBOARDS. -

(a) All panelboards will be of the bolt-in circuit breaker type with the number of branches of sizes and number of poles as required by the loads being served. All panelboards will have lugs only in the mains and will have 3 pole and solid neutral mains.

(b) Building owner panelboards will be located in the various electric closets as required.

(c) Tenant panelboards will be located in the tenant manufacturing areas.

IV-6. RECEPTACLES. -

(a) Convenience receptacles will be located throughout the tenants office and manufacturing areas. Convenience receptacles shall be rated 15 ampere, 125 volt, single phase, grounded type, of specification grade.

(b) Power receptacles in tenant manufacturing areas will be the responsibility of the tenant.

IV-7. WALL SWITCHES. -

(a) Wall switches for control of room lighting will be 20 ampere, totally enclosed, specification grade, single, double, or 3-way as required. Switches shall be A. C. rated.

IV-8. MOTORS. -

(a) All motors shall be of adequate rating for the size and type of loads being served.

(b) Motors rated 1/2 horsepower and lower shall be suitable for operation on 120 volt, single phase.

(c) Motors rated 3/4 horsepower and larger shall be suitable for operation of 208 volts, three phase.

IV-9. FIXTURES. -

(a) Electric fixtures in the office and manufacturing areas will be of the fluorescent type and shall employ the Gibson "Uni-Race" method of installation or an approved equal system. This system employs a basic "Uni-Race" assembly into which the fluorescent fixture units are installed with the electrical connection between the "Uni-Race" assembly and the fixture being made through a plug-in arrangement.

Illumination levels may be increased or decreased by adding or removing fixture units without disturbing the basic "Uni-Race" assembly.

(b) Electric fixtures in the office area will be of the recessed commercial type with option of louver or lens diffusers.

(c) Electric fixtures in the manufacturing area will be of the pendant industrial type.

(d) Only sufficient fixtures to produce an illumination level of twenty foot candles will be installed under this basic contract. Additional fixtures required for higher levels of illumination will be the responsibility of the tenant.

(e) In the office area, there will be two rows of recessed fixtures. In the manufacturing area, there will be three rows of fixtures per bay.

(f) Electric fixtures for the corridors and foyer will be of the recessed fluorescent type, individual units, spaced to give an illumination level of 10 foot candles.

(g) Stairway and toilet room electrical fixtures shall be of the recessed incandescent type of wattage sufficient to produce an illumination level of 10 foot candles.

(h) Electric fixtures for the basement areas will be of the incandescent type with RLM dome reflectors of adequate wattage to produce an illumination level sufficient for the type area being served.

(i) Platform lighting will be of the incandescent type with dome reflectors.

IV-10. WIRING. -

(a) Cables for the underground primary service will be of a size and type as recommended by the Boston Edison Company and will be installed in fiber duct encased in concrete.

(b) Feeder cables, exclusive of the bus-duct feeders, will be of adequate size for the loads being served, will be type RHW, and will be installed in rigid conduit.

(c) Branch circuit wiring will be installed in rigid conduit and electrical metallic tubing. Cables will be type TW.

(d) Street lighting cables will be 2cf#6, 600 volt, type RR installed in type II fiber duct, underground.

IV-11. BUS-DUCT. -

(a) Bus-duct for the tenant feeders will be of a size adequate for the loads being served, will be of either copper or aluminum bus, at the option of the Contractor, and will be of the plug-in type. Bus-duct will be installed with all required bends, terminals, fittings or other accessories.

(b) Switches used for the connection of panelboard circuits to the bus-duct at tenant electric rooms, will be of adequate size for the loads being served and will be of a type which will readily plug into the bus-duct.

IV-12. STREET AND AREA LIGHTING. -

(a) Street and area lighting will be of the mercury lamp type of illumination.

(b) Lighting standards will be aluminum poles equipped with a six foot single bracket, transformer base, will allow a mounting height for the luminaire of 27 feet 8 inches, and will be similar and equal to General Electric design No. 277TLb.

(c) Luminaire will produce an IES Type III distribution, will be suitable for use with an H400-El, mogul multiple socket lamp, and will be similar and equal to General Electric Form 400.

(d) Lamp ballast will be suitable for use with an H400-El mercury lamp, will operate on a 208 volt, single phase circuit, and will be located in the transformer base of the lighting standard.

(e) Street and area lighting circuits will be controlled by an astronomical time clock located in the basement electric room.

IV-13. EMERGENCY LIGHTING. -

(a) Emergency lighting units will be located in the corridors and stairways to provide emergency lighting for these areas.

(b) Units will be of the individual 6 volt, nickel-cadmium battery type, with double heads mounted on each unit.

(c) Units will be mounted on wall brackets, located approximately seven feet above floor and will be permanently connected with flexible conduit to wall outlet.

IV-14. TELEPHONE. -

(a) Empty conduits with surface mounted cabinets in the electric rooms, will be installed for the future installation of telephone cable and equipment by the telephone company.

(b) A main terminal cabinet will be located in the basement electric room with one-two inch conduit from this cabinet to the terminal cabinets in each tier of tenant electric rooms.

(c) Main terminal cabinet will be 36" x 24" x 6". Terminal cabinets in the tenant electric rooms will be 18" x 12" x 6". All cabinets will be provided with 1/2" plywood backboards.

(d) Empty 1" conduits will be installed from the terminal cabinet in the tenant electric rooms to telephone outlets in the tenant quarters.

PRELIMINARY ENGINEERING COST ESTIMATES

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REPORT NO. 4

September, 1963

Project No. 73962

RELIMINARY ENGINEERING COST ESTIMATE, PROJECT #73952 - B.R.A. FEASIBILITY STUDY - EPORT NO. 4

Description	Unit	Quantity	Unit Cost	Eng. Cost Est.
REPARATION OF SITE - EARTHWORK AND CLEANUP				
xcavation	C.Y.	24,025	$ .60	$ 14,415.00
emove Surplus Material	C.Y.	10,000	.80	8,000.00
uilding Gravel	C.Y.	500	1.80	900.00
ompacted Gravel	C.Y.	10,500	2.10	22,050.00
idewalk Gravel	C.Y.	540	2.10	1,134.00
ituminous Parking Area	S.Y.	12,380	1.60	19,808.00
ituminous Roads	S.Y.	6,500	2.10	13,650.00
ituminous Loading Platform Ramp	S.Y.	5,000	2.10	10,500.00
oam	C.Y.	275	3.00	825.00
rade, Fertilize and Seed	S.Y.	4,150	.70	2,905.00
xterior Storm Drain	L.S.			45,240.00
xterior Water	L.S.			10,620.00
xterior Sanitary	L.S.			5,700.00
xterior Gas Piping	L.S.			4,740.00
oncrete Walks	S.F.	37,350	.30	11,205.00
aint Parking Lines	L.S.			300.00
		TOTAL (For 5 Buildings)		$ 171,992.00

$\frac{172,000}{5}$ = $34,400.00

TOTAL For 1 Building		$ 34,400.00
	Say	$ 35,000.00

ELIMINARY ENGINEERING COST ESTIMATE, PROJECT #73962 - FEASIBILITY STUDY, B.R.A. -

PORT NO. 4 (continued)

Description	Unit	Quantity	Unit Cost	Eng. Cost Est.
ID FLAT SLAB (1/2 of 1 FLOOR)				
lumns	C.Y.	37	$ 55.00	$ 2,000.00
ams	C.Y.	65	70.00	4,600.00
id Flat Slab	C.Y.	325	65.00	21,300.00
ce Brick	EA.	17,000	.20	3,400.00
Concrete Blocks	EA.	8,700	.90	7,800.00
Concrete Blocks	EA.	3,000	.70	2,100.00
rtain Wall	S.F.	1,200	5.00	6,000.00
sh	S.F.	800	3.00	2,400.00
ass	S.F.	1,250	1.20	1,500.00
airs, Risers	EA.	40	45.00	1,800.00
airs, Landing	S.F.	40	6.00	400.00
sp. Plaster Ceilings	S.Y.	90	9.00	800.00
coustic Tile Ceilings	S.F.	3,600	.80	2,900.00
eramic Tile Walls	S.F.	1,300	1.70	2,200.00
eramic Tile Floors	S.F.	780	1.40	1,100.00
ingle Doors & Frames	EA.	24	125.00	3,000.00
verhead Doors	EA.	3	800.00	2,400.00
oilet Partitions	EA.	10	120.00	1,200.00
sphalt Tile Flooring	S.F.	3,600	.70	2,500.00
ainting	L.S.			4,000.00
ardware	L.S.			3,000.00
				$ 76,400.00
			Call	$ 76,500.00

76,500 x 2 = 153,000 per floor

ELIMINARY ENGINEERING COST ESTIMATE, PROJECT #7382 - B.R.T. TRANSPORTATION STUDY -
PORT NO. 4 (continued)

Description	Unit	Quantity	Unit Cost	Eng. Cost Est.
SEMENT				
NCRETE:-				
Foundation Walls	C.Y.	350	$ 50.00	$ 17,500.00
Basement Floor	C.Y.	175	50.00	8,800.00
Columns & Piers	C.Y.	10	60.00	1,100.00
8" Concrete Block	EA.	4,300	.90	4,300.00
Stairs, Risers	EA.	36	45.00	1,600.00
Stairs, Landings	S.F.	64	6.00	400.00
Stairs to Boiler Room	L.S.			400.00
Single Doors & Frames	EA.	6	125.00	700.00
Double Doors & Frames	EA.	4	175.00	700.00
Painting	L.S.			1,000.00
Hardware	L.S.			900.00
				$ 37,400.00

ELIMINARY ENGINEERING COST ESTIMATE, PROJECT #73062 - B.R.T. TRANSIT STUDY -

PORT NO. 4 (continued)

Description	Unit	Quantity	Unit Cost	Eng. Cost Est.
OF - GRID FLAT SLAB				
of Slab	C.Y.	480	$ 65.00	$ 31,200.00
ams	C.Y.	109	70.00	7,600.00
nopy Roof Slab	C.Y.	45	60.00	2,700.00
ading Platform	C.Y.	50	50.00	2,500.00
of Insulation	S.F.	25,600	.30	7,700.00
& G Roofing	SQ.	269	32.00	8,600.00
pper Gravel Stop	L.F.	1,334	1.50	2,000.00
nthouses	L.S.			19,000.00
scellaneous Flashing	L.S.			500.00
				$ 91,800.00
SCELLANEOUS ITEMS				
ntrance Doors	PR.	4	1,700.00	$ 2,800.00
mestone	S.F.	1,460	5.50	8,000.00
bby Stairs	RISER	6	90.00	500.00
bby	L.S.			2,000.00
bby Railing	L.S.			200.00
				$ 13,500.00

RELIMINARY ENGINEERING COST ESTIMATE, PROJECT 73562 - L.A. , ALTERNATIVE STUDY -
EPORT NO. 4 (continued)

Description	Unit	Quantity	Unit Cost	Eng. Cost Est.
LUMBING - 4 STORY BUILDING				
oof Drainage	L.S.			$ 4,300.00
as Piping	L.S.			2,300.00
old Water Piping	L.S.			11,800.00
ot Water Piping	L.S.			7,000.00
ot Water Return Piping	L.S.			1,700.00
anitary	L.S.			17,000.00
ixtures	L.S.			30,000.00
quipment	L.S.			6,700.00
ccessories	L.S.			5,000.00
				$ 85,800.00
	10% Permit			8,580.00
				$ 94,380.00
	10% Overhead			9,440.00
	TOTAL PLUMBING COST			$103,820.00
			Say	$104,000.00
	Sprinkler Cost			$ 9,000.00

RELIMINARY ENGINEERING COST ESTIMATE, PROJECT #73962 - B.R.T. FEASIBILITY STUDY,

EPORT NO. 4 (continued)

Description	Unit	Quantity	Unit Cost	Eng. Cost Est.
LUMBING - 6 STORY BUILDING				
oof Drainage	L.S.			$ 4,800.00
as Piping	L.S.			2,900.00
old Water Piping	L.S.			15,200.00
ot Water Piping	L.S.			9,500.00
ot Water Return Piping	L.S.			2,100.00
anitary & Vent	L.S.			22,000.00
ixtures	L.S.			44,000.00
quipment	L.S.			11,200.00
ccessories	L.S.			7,500.00
				$ 119,200.00
	10% Profit			11,920.00
				$ 131,120.00
	10% Overhead			13,120.00
	TOTAL PLUMBING COST			$ 144,240.00
			Say	$ 145,000.00
	Sprinkler Cost			$ 40,000.00

RELIMINARY ENGINEERING COST ESTIMATE, PROJECT #73962 - B.R.A. FL HUMILITY STUDY -

EPORT NO. 4 (continued)

Description	Unit	Quantity	Unit Cost	Eng. Cost Est.
IRE PROTECTION AND SPRINKLERS				
STORY BUILDING:-				
Sprinklers - Basement Only				
Area = 6500 s.f. / 100 s.f. per head = 65 Heads				
65 Heads @ $30. per head				
1,950 - Say $3,000 incl. hydrants				$ 3,000.00
-1/2" First aid standpipe with hose cabs & fire extinguishers				
ay 4 units per floor and 2 in basement -				
otal = 18 @ $200.00 = $3,600.00				
Piping 2,000.00				
$5,600.00				$ 5,600.00
				$ 8,600.00
			Say	$ 9,000.00
STORY BUILDING:-				
Area = 161,600 s.f. / 100 s.f. per head = 1,616 Heads				
1,616 Heads @ $25.00 per head =			Say	$ 40,000.00

ELIMINARY ENGINEERING COST ESTIMATE, PROJECT #73362 - B.R.A. RENSSELAER STUDY -

PORT NO. 4 (continued)

Description	Unit	Quantity	Unit Cost	Eng. Cost Est.
ATING AND VENTILATING - 4 STORY BUILDING				
BUILDING HEATING SYSTEM				
INCLUDES:				
Supply & Return Steam Risers for Office Areas - L.S.				$ 300.00
Supply & Exhaust Duct Risers for Office Areas - L.S.				3,300.00
Supply & Return Steam Risers for Manufacturing Areas - L.S.				2,500.00
Supply & Return Duct Risers for Manufacturing Areas - L.S.				7,000.00
Condensate Meters & Basement Piping - L.S.				8,300.00
Exhaust Ducts for Toilets - L.S.				3,300.00
Unit Heaters & Piping for Heating of Manufacturing Areas - L.S.				22,300.00
Finned Radiation along the Perimeter of Office Areas - L.S.				20,000.00
Boiler Room Equipment & Piping & Oil Storage System - L.S.				20,000.00
				$ 87,000.00
MANUFACTURING AREAS VENTILATION				
INCLUDES:				
Air Handling Units, Ductwork and Diffusers - L.S.				$ 29,000.00
		TOTAL FOR BUILDING		$116,000.00

ELIMINARY ENGINEERING COST ESTIMATE, PROJECT NY-3962 - B.R. . FEASIBILITY STUDY -

PORT NO. 4 (continued)

Description	Unit	Quantity	Unit Cost	Eng. Cost Est.
ATING AND VENTILATING - 6 STORY BUILDING				
BUILDING HEATING SYSTEM				
INCLUDES:				
Supply & Return Steam Risers for Office Areas	-	L.S.		$ 500.00
Supply & Exhaust Duct Risers for Office Areas	-	L.S.		4,900.00
Supply & Return Steam Risers for Manufacturing Areas	-	L.S.		4,900.00
Supply & Return Duct Risers for Manufacturing Areas	-	L.S.		9,500.00
Condensate Meters & Basement Piping	-	L.S.		9,800.00
Exhaust Ducts for Toilets	-	L.S.		4,300.00
Unit Heaters & Piping for Heating of Manufacturing Areas	-	L.S.		33,000.00
Finned Radiation along the Perimeter of Office Areas	-	L.S.		29,000.00
Boiler Room Equipment & Piping & Oil Storage System	-	L.S.		37,100.00
				$ 123,000.00
MANUFACTURING AREAS VENTILATION				
INCLUDES:				
Air Handling Units, Ductwork & Diffusers	-	L.S.		$ 46,000.00
			TOTAL FOR BUILDING	$ 169,000.00

LIMINARY ENGINEERING COST ESTIMATE, PROJECT #73[illegible] - S.R.A. [illegible] FEASIBILITY STUDY -
ORT NO. 4 (continued)

Description	Unit	Quantity	Unit Cost	Eng. Cost Est.
CTRIC WORK - 4 STORY BUILDING				
ctric Room	L.S.			$ 7,706.00
ller Room Feeder, etc.	L.S.			749.00
sement Panel & Feeder	L.S.			267.00
ner's feeder tenant floors	L.S.			530.00
ner's Lighting - Corridors, Stairs,				
Basement	L.S.			7,010.00
evators	L.S.			4,116.00
nant Feeders	L.S.			19,234.00
nant Area Lighting by Owner				
(to 22 ft. candles)	L.S.			44,928.00
				$ 84,590.00
			Say	$ 85,000.00
ECTRIC WORK - 6 STORY BUILDING				
ectric Room	L.S.			$ 8,490.00
iler Room Feeder, etc.	L.S.			749.00
asement Panel & Feeder	L.S.			267.00
ner's Feeder - Tenant Floors	L.S.			785.00
ner's Lighting-Corridors, Stairs, Basement - L.S.				9,493.00
levators	L.S.			4,469.00
enant Feeders	L.S.			28,687.00
enant Area Lighting by Owner (to 22 ft. candles) - L.S.				67,392.00
				$ 120,332.00
			Say	$ 120,000.00

ased on Gibson fixtures, 2 tube and uni-race plus office air conditioning.

LIMINARY ENGINEERING COST ESTIMATE, PROJECT #73062 - B.R. . . FEASIBILITY STUDY -

ORT NO. 4 (continued)

Description	Unit	Quantity	Unit Cost	Eng. Cost Est.
OST SUMMARY - 4 STORY BUILDING - GRID FLAT SLAB				
asement				$ 37,400.00
4 floors @ $153,000.00				612,000.00
oof, etc.				81,800.00
iscellaneous Items				13,500.00
ovable Partitions				42,400.00
levators:-				
4 Freight - $120,000.00				
2 Pass. - 60,000.00				
$180,000.00				180,000.00
ile Foundations				146,400.00
ite Work				35,000.00
lumbing				104,000.00
ire Protection & Sprinklers				9,000.00
lectric				85,000.00
lating & Ventilating				116,000.00
			TOTAL COST OF BLDG.	$1,472,500.00
			Call	$1,473,000.00

EA OF BUILDING:-

25,700 s.f. per floor

4 floors

,800
,500 (Basement)
900 Loading Platform
,200 s.f. total.

$$\frac{\$1,473,000.00}{110,200} = \$13.36 \text{ per s. f.}$$

ELIMINARY ENGINEERING COST ESTIMATE, PROJECT [illegible] - B.A.R.T. [illegible] FEASIBILITY STUDY -

PORT NO. 4 (continued)

Description	Unit	Quantity	Unit Cost	Eng. Cost Est.
OST SUMMARY - 6 STORY BUILDING - GRID FLAT SLAB				
sement				$ 37,400.00
Floors @ $153,000.00				918,000.00
of, etc.				81,800.00
scellaneous Items				13,500.00
vable Partitions				63,600.00
levators:				
4 Freight - $140,000.00				
2 Pass. - 72,000.00				
$212,000.00				212,000.00
lle Foundations				195,200.00
lte Work				35,000.00
lumbing				145,000.00
ire Protection & Sprinklers				40,000.00
lectric				120,000.00
eating & Ventilating				169,000.00
		TOTAL COST OF BUILDING		$2,030,500.00
		Call		$2,031,000.00

REA OF BUILDING:-

4 Story Building 110,200 s.f.
dd for 2 floors
2 x 25,700 s.f. = 51,400
151,600 s.f.

$\frac{\$2,031,000.00}{151,600 \text{ s.f.}} = \$12.56$ per s.f.

RELIMINARY ENGINEERING COST ESTIMATE, PROJECT #73962 - U.P. . FEASIBILITY STUDY -

REPORT NO. 4 (continued)

Description	Unit	Quantity	Unit Cost	Eng. Cost Est.
COST SUMMARY - 4 STORY BUILDING - FLAT SLAB WITH DROP PANELS				
Basement				$ 37,400.00
4 Floors @ $156,500.00				626,000.00
Roof, etc.				82,840.00
Miscellaneous Items				13,500.00
Movable Partitions				42,400.00
Elevators				180,000.00
Pile Foundations				157,600.00
Site Work				35,000.00
Plumbing				104,000.00
Fire Protection & Sprinklers				9,000.00
Electric				85,000.00
Heating				116,000.00
		TOTAL COST OF BUILDING		$1,488,740.00
			Call	$1,489,000.00

$$\frac{\$1,489,000.00}{110,200 \text{ s.f.}} = \$13.51 \text{ per s.f.}$$

LIMINARY ENGINEERING COST ESTIMATE, PROJECT #73962 - E.P.A. [illegible] STUDY -

ORT NO. 4 (continued)

Description	Unit	Quantity	Unit Cost	Eng. Cost Est.
T SUMMARY - 6 STORY BUILDING - FLAT SLAB WITH DROP PANELS				
ement				$ 37,400.00
loors @ $156,500.00				939,000.00
f, etc.				82,840.00
cellaneous Items				13,500.00
able Partitions				63,600.00
vators				212,000.00
e Foundations				208,000.00
e Work				35,000.00
bing				145,000.00
e Protection & Sprinklers				40,000.00
tric				120,000.00
ing				169,000.00
		TOTAL COST OF BUILDING		$ 2,065,340.00
		Call		$ 2,066,000.00

$$\frac{\$2,066,000.00}{161,680 \text{ s.f.}} = \$12.78 \text{ per s.f.}$$

Chester Browne
and ASSOCIATES, INC.
rchitects and Engineers
-128 ARLINGTON STREET
BOSTON 16, MASS.
HUbbard 2-6060

COMPUTATIONS

SUBJECT PRELIMINARY ESTIMATE & COST ESTIMATE, B.R.A. FEASIBILITY STUDY — PREP. BY — SHEET 5

COST ANALYSIS, STUDY & PREPARATION OF TOTAL BUILDING COST ESTIMATE, TABLE OF ELEVATORS, PILE FOUNDATIONS, SITE WORK, PLUMBING, FIRE PROTECTION & SPRINKLERS, ELECTRICAL, HEATING. — CHKD.

PROJ. [illegible] REPORT # 4. — APPRD.

DATE SEPT. 19-3

BE USED ONLY WITH ACCOMPANYING DATA

MS

	4 TORY FLAT SLAB	4 STORY GRID FLAT SLAB	6 STORY FLAT SLAB	6 STORY GRID FLAT SLAB
TOTAL COST COST PER SQ. FT.	$ 1,457,000 - $ 13.51	$ 1,473,000 - $ 13.66	$ 2,066,000 - $ 12.78	$ 2,031,000 - $ 12.56
ELEVATORS — COST	$ 80,000 -	$ 85,000 -	$ 210,000 -	$ 210,000 -
ELEVATORS — % OF TOTAL COST	.1%	12.2%	10.2%	10.4%
ELEVATORS — COST PER SQ. FT. BLDG.	$ 1.13	$ 1.69	$ 1.31	1.31
PILE FOUNDATIONS — COST	$ 157,000 -	$ 146,000 -	$ 268,000 -	$ 195,000 -
PILE FOUNDATIONS — % OF TOTAL COST	10.6%	9.9%	13.1%	9.6%
PILE FOUNDATIONS — COST PER SQ. FT. BLDG.	$ 1.45	$ 1.33	$ 1.29	$ 1.21
SITE WORK — COST	$ 35,000 -	$ 35,000 -	$ 35,000 -	$ 35,000 -
SITE WORK — % OF TOTAL COST	2.3%	2.3%	1.6%	1.7%
SITE WORK — COST PER SQ. FT. BLDG.	$ .32	$ .32	$ .22	.22
PLUMBING — COST	$ 103,000 -	$ 104,000 -	$ 145,000 -	$ 145,000 -
PLUMBING — % OF TOTAL COST	7.0%	7.1%	7.0%	7.1%
PLUMBING — COST PER SQ. FT. BLDG.	$ .94	$ .94	$ .90	$ .90
FIRE PROTECTION & SPRINKLERS — COST	$ 9,000 -	$ 9,000 -	$ 41,000 -	$ 40,000 -
FIRE PROTECTION & SPRINKLERS — % OF TOTAL COST	.6%	.6%	1.9%	2.0%
FIRE PROTECTION & SPRINKLERS — COST PER SQ. FT. BLDG.	$ .08	$ .08	$ .25	$ .25
ELECTRICAL — COST	$ 82,000 -	$ 82,000 -	$ 120,000 -	$ 120,000 -
ELECTRICAL — % OF TOTAL COST	5.7%	5.6%	5.8%	5.9%
ELECTRICAL — COST PER SQ. FT. BLDG.	$ .77	$ .77	$ .75	$ .75
HEATING — COST	[illegible]	$ 111,000 -	$ 164,000 -	$ 164,000 -
HEATING — % OF TOTAL COST	7.8%	7.1%	7.9%	8.1%
HEATING — COST PER SQ. FT. BLDG.	$ 1.05	1.05	$ 1.02	$ 1.05

Chester Browne
and ASSOCIATES, INC.
Architects and Engineers
2-128 ARLINGTON STREET
BOSTON 16, MASS.
HUbbard 2-6060

COMPUTATIONS

SUBJECT [illegible] PREP. BY [illegible] SHEET 1 of 16

CONC. TARGET - 4 BAY FLAT - A.P. CHKD. PROJ. 7[illegible]

TYPICAL FLOOR APPRD. DATE [illegible]

) BE USED ONLY WITH ACCOMPANYING DATA

EMS

TYPICAL BAY - VOLUME OF CONCRETE

23 x 23' = 782 S.F. EX. DOME 2 PLACES 1.75 C.F.

SLAB 782 x 1.00 = 782 C.F.

171 DOMES CUT x 1.75 = -299

$\frac{5.50}{27}$ C.F. = 20.5 C.Y.

FOR ½ FLOOR

20.5 x 13 BAYS = 266 C.Y.

[illegible]

FOR [illegible]

2 x 13 x [illegible] = [illegible]

[illegible]

7' x 8' = [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

COLUMNS

VOL. OF COL. CAP

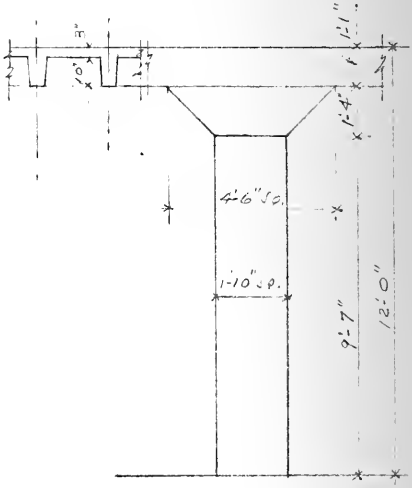
$\frac{4.5 \times 4.5 \times .33}{2}$ = 13.6 C.F.

[illegible]

.33 x [illegible] x 4.5 = 220 C.F.

45 C.F.

[illegible] x [illegible] = [illegible] C.F. 37 C.F.



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Architects and Engineers
2-128 ARLINGTON STREET
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HUbbard 2-6060

COMPUTATIONS

SUBJECT Z. L. K. PREP. BY

GRID FLAT SLAB CHKD.

TYPICAL FLOOR APPRD.

SHEET 2 OF 16

PROJ. 7316 REPORT # 4

DATE SEPT. 1963

TO BE USED ONLY WITH ACCOMPANYING DATA

ITEMS VOLUME OF CONCRETE (1/2 FLOOR) CONT'D

BEAMS

SPANDRELS

$\frac{336 \text{ L.F.} \times .83' \times 3'}{27} = 31$ C.Y.

AT ELEV. 7 STAIR OPNG.

$\frac{456 \text{ L.F.} \times .83' \times 2.5}{27} = 35$ C.Y.

66 C.Y.

FLOOR SLAB

FROM 12" x 24" 144

ADD FOR 14" FL.

(AVERAGE TO 4 ITEMS)

100 x 12' = 240 #

- SUBTRACT

17 x 4 x 5.5" = -370

370 ÷ 4 = 210

REAR

114' x 12 = 1368

- MINIMUM 423

945

945

EAST

114 x 12 = 1368

- MINIMUM = - 315

1053

1053

$\frac{1053}{2224 \times 7\frac{1}{2}} =$ SAY .7 C.Y. PER 1/2 FL.

8" CONCRETE BLOCK

EXTERIOR WALLS

2224 ft. = 24 S.F. x 3 BLOCKS/S.F. = 2640

PARTITIONS

1ST, TENANT SPACES	126 L.F.
MAIN CORRIDOR	224
STAIR HALLS & STAIRWAYS	70
ELEV.	66

486 L.F. x 11' 1" = 5340 ♦ = 54 C.Y. x 110 = 5940

SAY 5700 BLOCKS

Chester Browne
and ASSOCIATES, INC.
Architects and Engineers
12-128 ARLINGTON STREET
BOSTON 16, MASS.
HUbbard 2-6060

COMPUTATIONS

SUBJECT B. P. A. PREP. BY. [illegible] SHEET 3 of 6

SE C FLRT CLKR CHKD. PROJ. 7[illegible] REVD. # 4

TYP TOWN PLANN 1/2 APPRD. DATE SEPT. 1960

) BE USED ONLY WITH ACCOMPANYING DATA

EMS

4" CONCRETE BLOCK 1/2 FLOOR

200 L.F. x 8'6" HT = 1700

90 " x 11' HT = 990

2690 = 27 Sq. x 110 = 3000 BLOCKS

CURTAIN WALL (INCLUDES SASH BUT NO GLAZING)

38

2

76

14

90 L.F. x 12' HT = SAY 1200 Sq. Ft.

SASH

END WALL

16 x 4'

4 L.F. x 5 9' HT = 350 Sq. Ft.

REAR WALL

11 x 4'

44 L.F. x 7.5' HT = 330 Sq. Ft.

GLAZING

END WALL

21 x 4'

84 L.F. x 5.5' HT = 462 Sq. Ft.

END WALL = 352

REAR " = 418

1232 Sq. Ft.

PLASTER CEILING (TOILET AREAS ONLY)

45 x 18 = 810 Sq. Ft. = 90 S.Y.

Chester Browne
and ASSOCIATES, INC.
Architects and Engineers
2-128 ARLINGTON STREET
BOSTON 16, MASS.
HUbbard 2-6060

COMPUTATIONS

SUBJECT [illegible] PREP. BY [illegible] SHEET 4 OF 16
CHKD. PROJ.
APPRD. DATE

TO BE USED ONLY WITH ACCOMPANYING DATA

ITEMS

TYPICAL BAY - VOLUME OF CONCRETE - FLAT
25'x 23' = 700 S.F. EA. ZONE DIAGONALS 1.5 S.F.
700 + 33' = 650 S.F.
BEAM SIZE
15" x 15" = 32 L.F.
450 / 27 = 15 C.Y.
32 BARS x 15" LONG = 420 L.F.

BEAMS
.92 C.F. x 33 x 3' = 62 C.F.
27

ZEANS
[illegible]

CK. FOR ZONE AREA
[illegible]

LOADING PLATE
[illegible]

ROOF OPENING
1/4" x 2.6' = 2 C.F.

TOP
[illegible]

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COMPUTATIONS

SUBJECT [illegible] PREP. BY [illegible] SHEET 5 OF 16

[illegible] CHKD. PROJ. [illegible]

APPRD. DATE [illegible]

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MS

[illegible]

[illegible]

[illegible]

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COMPUTATIONS

SUBJECT ..... PREP. BY ..... SHEET ..... OF 16

CHKD. ..... PROJ. .....

APPRD. ..... DATE .....

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NS

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COMPUTATIONS

SUBJECT M. I. T. PREP. BY [illegible] SHEET 7 of 16

CONC. TAKEOFF - FLAT SLAB WITH CHKD. PROJ. 731 A.4 REPORT #4

DROP PANELS APPRD. DATE SEPT. 1951

ROOF SLAB

BE USED ONLY WITH ACCOMPANYING DATA

MS

6" SLAB, 10" AT DROP PANELS

VOL. OF CONC.

SLAB 20' x 16' x .5' = 160 C.F.

DROP PANEL 2.33 x 1.33 x .33 = 1 C.F.

4 x 4 C.F. = 16 C.F. PER BAY

= 9

9 BAYS

416 C.F.

- 403 C.F. FOR FLAT AS

16 C.Y. MORE THAN GRID

$ 65 PER C.Y.

$ 1,040 MORE THAN GRID.

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COMPUTATIONS

SUBJECT E. E. A. BASEMENT

PREP. BY [illegible] SHEET 2 of 6

CHKD.

PROJ. 7396 L REPORT #4

APPRD.

DATE SEPT. 19 [illegible]

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MS

EXCAVATION FLOOR SLAB

$\frac{112' \times 56' \times .75'}{27} = 175$ C.Y.

ELEVATOR PIT, METER VAULT

$\frac{340 \text{ L.F.} \times 1' \times 13.25'}{27} = 167$ C.Y.

ADD FOR EXCAVATION FOR METER WALL

$\frac{120 \text{ L.F.} \times 6'}{27} = 27$ C.Y.

GRADE BEAM CAISSON STAGE

26 L.F. X 6.5 C.F./L.F. = 169 C.F.

+ 164 C.F. X 3.5 C.F./L.F. = 574 C.F.

$\frac{743 \text{ C.F.}}{27} = 28$ C.Y.

ELEV. PIT CALC.

AT 2'-6" WALL

36 L.F. X 1' DEEP = 13 C.F.

FREIGHT AT 2'-6" WALL

76 L.F. X 5' DEEP = 380 C.F.

ELEV. AT END

36 L.F. X 5' DEEP = 180 C.F.

PASS. EL.

42 L.F. X 5' DEEP = 240 C.F.

$\frac{1013 \text{ C.F.}}{27} = 38$ C.Y.

BELOW GRADE BEAMS

$\frac{134 \text{ C.F.} \times 4' \text{ DEEP}}{27} = 20$ C.Y.

TOTAL = 348 C.Y. CALL 350 C.Y.

COLS.

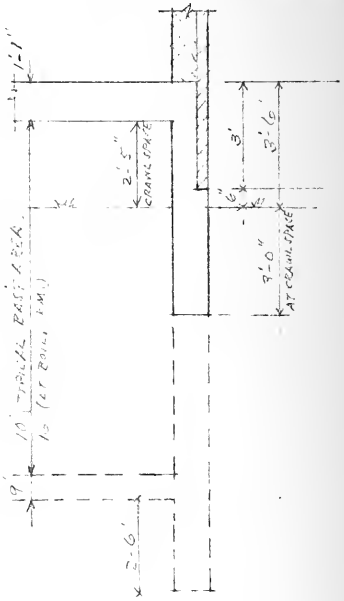
2 INTERIOR COLS. X 2' = 4 C.Y.

16 EXTERIOR COLS. X 1' = 12 C.Y.

16 C.Y.

8" CONCRETE DESIGN

428 L.F. X 10'-4" = 4280 ft² = 48 SQ. X 10 = 480 46 BLOCKS



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SUBJECT B. & L. PREP. BY

PILE FOUNDATIONS CHKD.

GAS FLARE STACK APPRD.

SHEET 9 OF 16

PROJ. 7294 — REPORT #4

DATE SEPT. 1962

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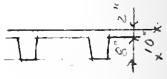
MS

PILE CAPACITY = 125 TONS PER PILE

AVERAGE LENGTH = 80' @ $5.50 PER L.F. = $440.00 PER PILE

ROOF



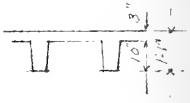
LIVE LOAD =

PILE LOAD =

Total Load =

Total Load Per Pile =

FLOOR



LIVE LOAD

DEAD LOAD

Total Load =

Total Load Per Pile =

LIVE LOAD

Total Load =

Total Load Per Pile =

LOAD PER PILE DUE TO ALL DEAD LOAD

Total Load =

4 FLOORS @ 182,000 # = 728,000 #

Total Load =

Total Load Per Pile =

ROOF FLOORS & WALLS

Total Load = 36,000 #

Total Load =

Total Load Per Pile =

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COMPUTATIONS

SUBJECT [illegible] PREP. BY [illegible] SHEET 10 OF 16

[illegible] CHKD. PROJ. [illegible]

[illegible] FLAT SLAB APPRD. DATE SEPT. 1963

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MS

END SPACE - INTERIOR COL. LINE A

[illegible]

4 FLOORS

4 x 14 x 25 x 324# = 2 6 7 2 0 0

WALLS

4 x 24' x 28' x 1.5# = 1 3 4 4 0

CEILING

1.5" x 28 x [illegible]# = [illegible]

CONC. COL. = [illegible]

FOR 6 FLOORS ABV 2 FLOOR TOTAL # = 164400 — 6 0 1 0 2 5 = 2 5 TONS ÷ 10 = 3 PILES

WALLS 2 x 24' HT x 10# = 67200

C.L. = 135450

264000# — [illegible] = 4 3 3 TONS ÷ 10 = 5 PILES

FRONT WALL - INTERIOR COL. LOAD

2 x [illegible] = [illegible]

LL. 12# [illegible]

43# -4.43 x 14 x 2 = -675 [illegible]

-00, 1 = 3 [illegible]

[illegible] COL.

CONC. [illegible]

24 x .5' x 28 x [illegible] = [illegible]

[illegible]

28 x 25 HT. 3# = [illegible]

1" FL. SLAB

28 x 12' x [illegible]# = [illegible]

SPACE B1

[illegible] — 7 4 [illegible] = 3 [illegible] TONS ÷ 10 = 3 PILES

FOR 4 FLOOR ABV

2 FLOORS @ 75 = 150 x [illegible]# = [illegible]

CONTAINING AREA 28' x 24' x 50# = 33600

C.L. = 135450

SPACE B1 = [illegible]

186000 # — 1 6 [illegible] = [illegible] TONS ÷ 10 = 4 PILES

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COMPUTATIONS

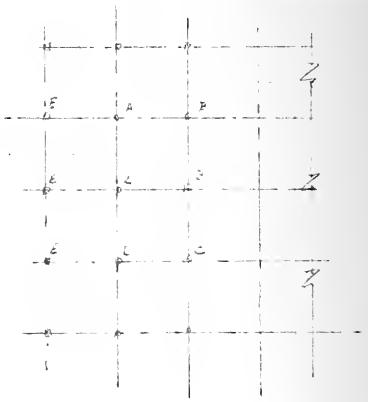
SUBJECT ..... PREP. BY ..... SHEET 11 OF 16

CHKD. ..... PROJ. 7396 PERMIT # 4

APPRD. ..... DATE SEPT 1943

BE USED ONLY WITH ACCOMPANYING DATA

MS



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SUBJECT ..... PREP. BY ..... SHEET

..... CHKD. ..... PROJ.

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BASEMENT AREA

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COMPUTATIONS

SUBJECT R.R.X. PREP. BY [illegible]
FILE [illegible] CHKD.
FLAT SLAB WITH DEC. PANELS APPRD.

SHEET 12 OF 16
PROJ. 723 [illegible]
DATE SEPT. 1963

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MS

LOAD PER SQ. (TYPICAL BAY) 411 PSF

FOR GRID FLAT SLAB = 422 TONS

DEAD LOAD (FLAT SLAB)

522 S.F. X 150 # = 78,300 #

DEAD LOAD (D.C. SLAB) = 22,200 #

11,300 # PER FLR. X INSIDE COLUMNS

4 FLOORS

45,200 # = 22 TONS

44.5 TONS = 5 PILES
105

LOAD PER SQ. (TYPICAL BAY) GROUND

FOR GRID FLAT SLAB = 218 TONS

FOR FIRST FLR. ADD 11,300 # = 34,200 # = 34 "

68.4 TONS = 7 PILES
105

TYPICAL COL. LOAD AT COL. BETWEEN 1ST. MF. AREA & FLOOR SLAB.

1. TYPICAL FLOOR LOAD (4 FLOORS) = 445 TONS

LIVE LD REDUCTION 1/2 BAY = 3,900 #

TYPICAL LIVE LD = 23 #

LIVE LD RED. ALLOWED = 8 # / 23 # X 3,900 # = 1,360 #

4 FLOORS

67,360 # = 34 TONS

441 TONS = 49 PILES

ADD 6 FLOORS

LD TYPICAL FLOOR = 645 TONS

LIVE LD REDUCTION 16,560 # X 0.6 = 12,936 # = 50 "

595 TONS = 68 PILES

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COMPUTATIONS

SUBJECT ..... PREP. BY ..... SHEET
CHKD. PROJ.
APPRD. DATE

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COMPUTATIONS

SUBJECT S. R. A. PASSENGER ELEVATORS

PREP. BY [illegible]

CHKD.

APPRD.

SHEET 15 OF 16

PROJ. 7376 - REPORT #4

DATE SEPT. 19 [illegible]

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MS

45 PERSONS PER TENANT SPACE

4 TENANT SPACES PER FLOOR

180 PERSONS PER FLOOR

2 FLOORS ABOVE THE GROUND FL. =

540 PERSONS

DESIRABLE CROWDING CAPACITY = 13% IN 5 MIN. PER

540 X .13 = 70 PERSONS IN 5 MIN.

TRAVEL = 12' X 3 = 36'

USE 2500 LB. CAR CAPACITY

12 PEOPLE " "

SPEED 600 FT. PER MIN.

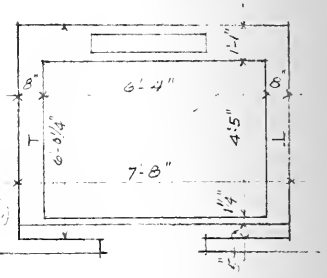
10 PASSENGERS PER MINUTE TRIP

ROUND TRIP TIME = 90 SECONDS

WAITING INTERVAL FOR 4 ELEVATORS = $\frac{90}{4}$ = 22 SECONDS

" " " 2 " = $\frac{90}{2}$ = 45 SECONDS (OK.)

IN 5 MINUTES 1 CAR WILL MAKE $\frac{5 \times 60}{90}$ = 3.7 TRIPS



@ 10 PASSENGERS PER TRIP 1 CAR WILL CARRY 37.5 PERSONS IN 5 MIN.

2 CARS WILL CARRY 75 PASSENGERS IN 5 MIN. (THIS IS 14%)

USE 2 ELEVATORS.

FOR 4 STORY BLDG. 2 PASS. ELEVATORS @ $30,000 - EA. = $60,000 -

FOR 6 " " 2 " " @ $36000 - EA = $72,000 -

USE DUPLEX SELECTIVE (CAR ANSWERS CALLS BEHIND THE OTHER)

PUSH BUTTON - NO ATTENDANT.

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COMPUTATIONS

SUBJECT P. I. L. — PREP. BY [illegible] — SHEET [illegible]

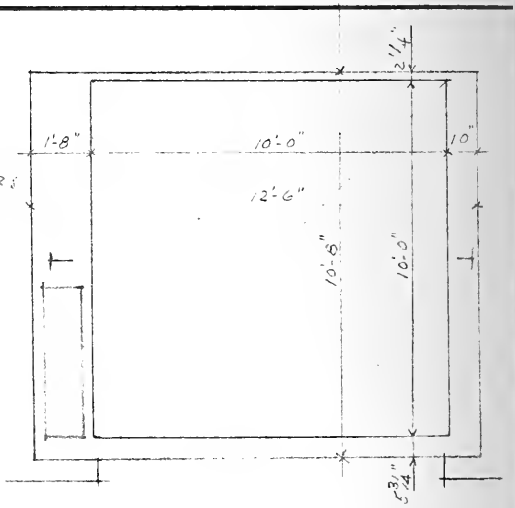
FREIGHT ELEVATORS — CHKD. — PROJ. [illegible]

APPRD. — DATE [illegible]

BE USED ONLY WITH ACCOMPANYING DATA

MS

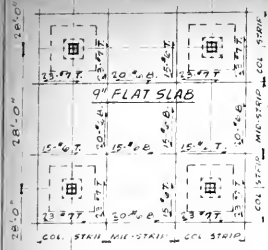
FOR UP TO 6 STORIES
USE 10'-0" PLATFORM
5000 LBS. CAPACITY
CLASS "C" SEALING
MANUALLY OPERATED BI-PARTING DOORS
(VERTICAL SLIDING - 2 HALF OPENING)
SINGLE AUTOMATIC CONTROL
SPEED 75 FT. PER MIN.



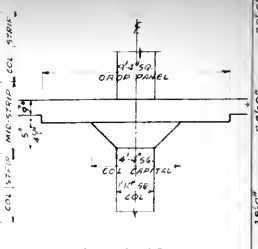
FOR 4 STORY BLDG. 4 FREIGHT ELEVATORS @ $30,000 - EA. = $120,000 -

FOR 6 " " 4 " " " @ $35,000 - EA = $140,000 -

SCHEME #1-CONCRETE FLAT SLAB WITH DROP PANELS

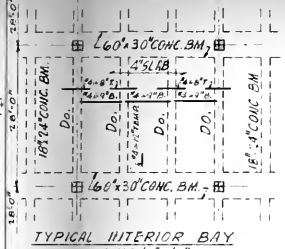


TYPICAL INTERIOR BAY
SCALE 1/16"=1'-0"

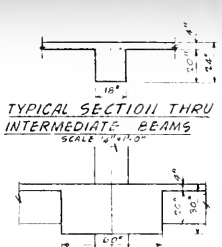


TYPICAL SECTION AT DROP PANEL
SCALE 1/4"=1'-0"

SCHEME #2 - CONCRETE BEAM AND SLAB



TYPICAL INTERIOR BAY
SCALE 1/16"=1'-0"



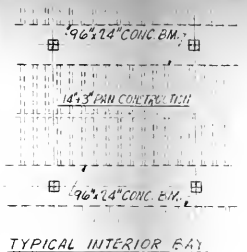
TYPICAL SECTION THRU INTERMEDIATE BEAMS
SCALE 1/4"=1'-0"

TYPICAL SECTION THRU MAIN BEAMS
SCALE 1/4"=1'-0"

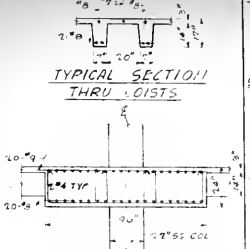
INTERMEDIATE BEAM REINF.
7-#9 (1.80 sq. in.) TOP & 5-#9 (1.80 sq. in.) BOT.

MAIN BEAM REINF.
18-#9 (1.80 sq. in.) TOP - 16-#8 (1.58 sq. in.) BOT.

SCHEME #3 - CONCRETE JOIST AND BEAM



TYPICAL INTERIOR BAY
SCALE 1/16"=1'-0"



TYPICAL SECTION THRU CONC. BEAM
SCALE 1/4"=1'-0"

COST ESTIMATE

SCHEME #1
- REINF. $ 0.75 P.S.F.
- CONCRETE $ 0.60 P.S.F.
- FORMS $ 0.68 P.S.F.

TOTAL COST PER SQ. FT. $ 2.03

SCHEME #2
- REINF. $ 0.80 P.S.F.
- CONCRETE $ 0.79 P.S.F.
- FORMS $ 1.26 P.S.F.

TOTAL COST PER SQ. FT. $ 2.85

SCHEME #3
- REINF. $ 0.95 P.S.F.
- CONCRETE $ 0.74 P.S.F.
- FORMS $ 0.74 P.S.F.

TOTAL COST PER SQ. FT. $ 2.43

SCHEME #4
- REINF. $ 0.51 P.S.F.
- CONCRETE $ 0.56 P.S.F.
- FORMS $ 0.74 P.S.F.

TOTAL COST PER SQ. FT. $ 1.81

SCHEME #5
- STRUCTURAL STEEL $ 1.20 P.S.F.
- REINF. $ 0.10 P.S.F.
- CONC. $ 0.21 P.S.F.
- FORMS $ 0.63 P.S.F.
- COL WRAP $ 0.95 P.S.F.

TOTAL COST PER SQ. FT. $ 3.69

SCHEME #6
- PRESTRESSED TEES $ 1.30 P.S.F.
- CONC. TOPPING $ 0.25 P.S.F.
- PRESTRESSED GIRDER $ 0.99 P.S.F.
- PRECAST COLUMN $ 0.23 P.S.F.

TOTAL COST PER SQ. FT. $ 2.77

NOTE: ALL SCHEMES HAD BASE ON A LIVE LOAD OF 150 P.S.F.

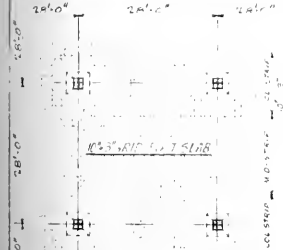
PRELIMINARY SEPT. 1963

PROPOSED PARKING GARAGE SCHEMES FOR CHAPEL HILL-CARRBORO BUS. DEVELOPMENT STUDY
SOUTH PARK SOUTON

W. CHESTER BROWNE AND ASSOCIATES
ARCHITECTS ENGINEERS
ALBERT GOLDBERG AND ASSOCIATES
STRUCTURAL ENGINEERS

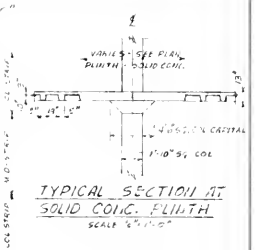
7370	S-1	C.H.P.	
PROJECT	DRAWING	BY	DATE

SCHEME #4 - 2 WAY GRID FLAT SLAB



TYPICAL INTERIOR BAY
SCALE 1/4"=1'-0"

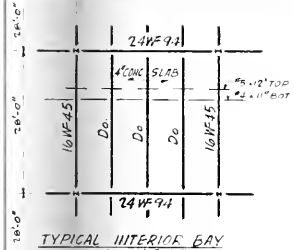
NOTE: DOMES 19" WIDE x 10" D. AT 8" WIDE TOPPING 3" THK.



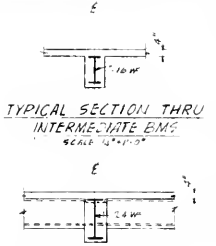
TYPICAL SECTION AT SOLID CONC. PLINTH
SCALE 1/4"=1'-0"

REINFORCING
COL STRIP: 14-#8 BARS TOP, 7-#8 BARS BOT.
MID-STRIP: 10-#6 BARS TOP, 7-#6 BARS BOT.
PLINTH: 15-#5

SCHEME #5 - CONCRETE SLAB ON FIRE-PROOFED ST. BEAMS



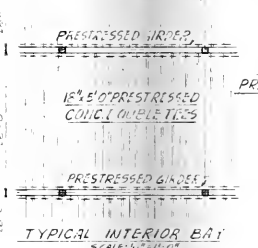
TYPICAL INTERIOR BAY
SCALE 1/16"=1'-0"



TYPICAL SECTION THRU INTERMEDIATE BMS
SCALE 1/4"=1'-0"

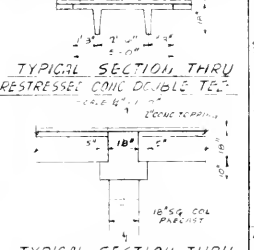
TYPICAL SECTION THRU MAIN BEAMS
SCALE 1/4"=1'-0"

SCHEME #6 PRESTRESSED DOUBLE TEES ON PRESTRESSED GIRDERS



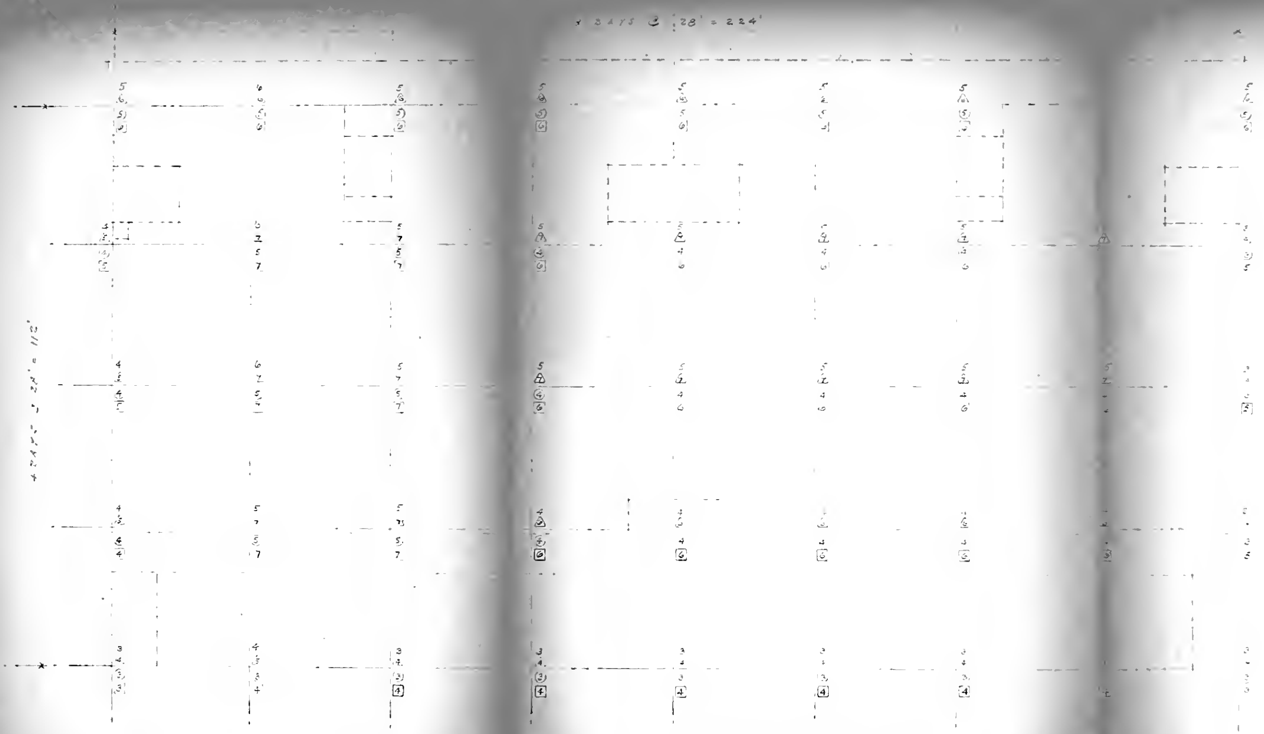
TYPICAL INTERIOR BAY
SCALE 1/4"=1'-0"

ELEV. OF PRESTRESSED GIRDER AT COL.
SCALE 1/4"=1'-0"



TYPICAL SECTION THRU PRESTRESSED CONC. DOUBLE TEE
SCALE 1/4"=1'-0"

TYPICAL SECTION THRU PRESTRESSED GIRDER
SCALE 1/4"=1'-0"



CONSTRUCTION	4 STORY BLDG.	6 STORY [illegible]
FLAT SLAB WITH DROP PANELS	197 PILES @ $ 800— $ 157,600—	260 PILES @ $ 800— $ 208,000—
GRID FLAT SLAB	183 PILES @ $ 800— $ 146,400—	244 PILES @ $ 800— $ 195,200—

PLAN SHOWING ESTIMATED NUMBER OF PILES REQUIRED AT EACH COLUMN LOCATION
SCALE 1/16" = 1'-0"

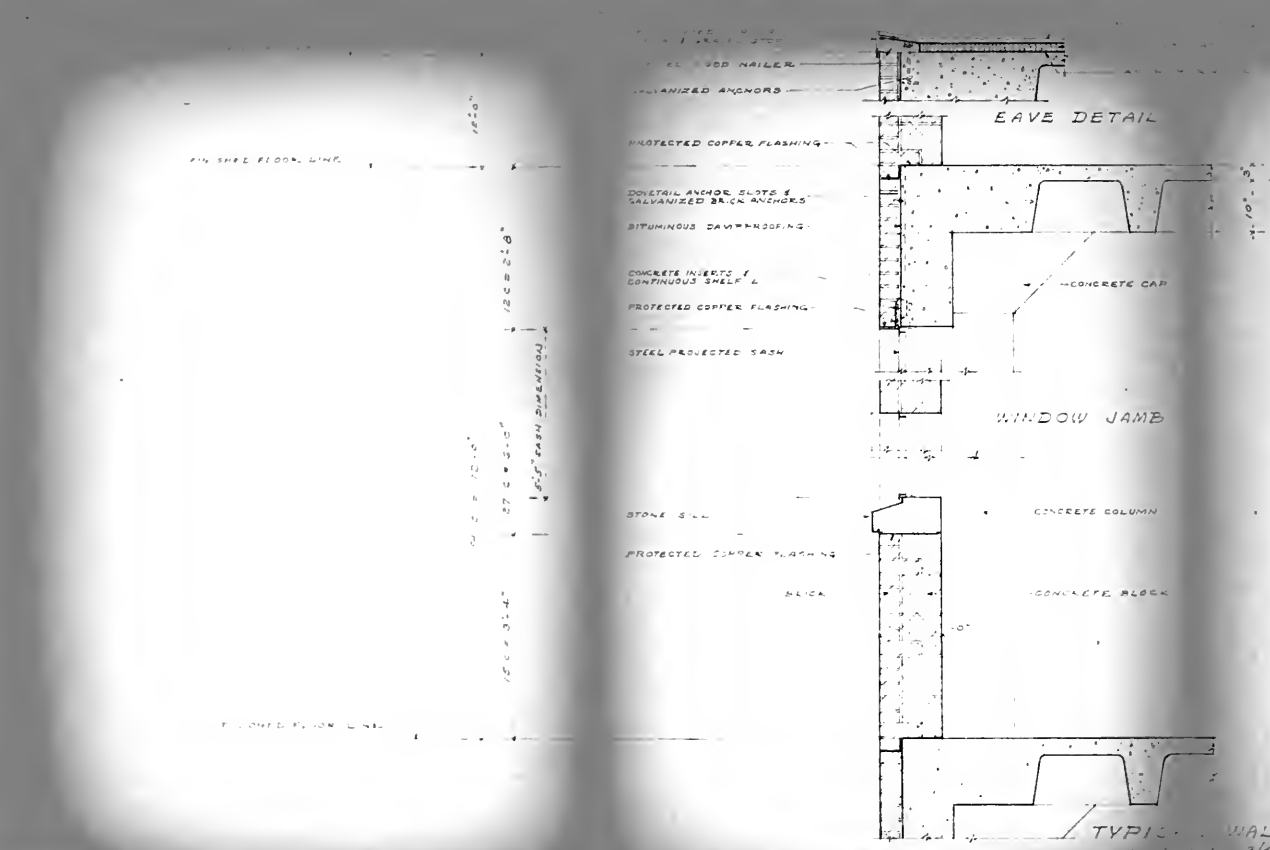
FIGURES SHOWN THUS: 6 INDICATE NUMBER OF PILES FOR A 4 STORY FLAT SLAB BUILDING AT EACH COLUMN LOCATION.
" " " △6 " " " " " 6 " " " " " " "
" " " ⓺ " " " " " 4 " GRID FLAT SLAB " " " "
" " " ▢6 " " " " " 6 " " " " " " " "

[illegible] SEPT. 1962

TYPICAL BUILDING
[illegible] INDUSTRIAL DEVELOPMENT STUDY
SOUTH END BOSTON

[illegible] AND ASSOCIATES
ARCHITECTS ENGINEERS
[illegible] BOSTON, MASS

73962	A-11		
PROJECT	DRAWING		


EAVE DETAIL
PROTECTED COPPER FLASHING
DOVETAIL ANCHOR SLOTS & GALVANIZED BRICK ANCHORS
BITUMINOUS DAMPPROOFING
CONCRETE INSERTS & CONTINUOUS SHELF L
PROTECTED COPPER FLASHING
STEEL PROJECTED SASH
CONCRETE CAP
WINDOW JAMB
STONE SILL
PROTECTED COPPER FLASHING
BRICK
CONCRETE COLUMN
CONCRETE BLOCK
TYPICAL WALL SECTION
3/4" = 1'-0"